Name:

at1117paper: Complete the Square (v314)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 42 feet. Their combined area, found by adding the square's area and the rectangle's area, is 520 square feet. What is the value of x?

Example's Solution

$$x^2 + 42x = 520$$

To complete the square, add $\left(\frac{42}{2}\right)^2 = 441$ to both sides.

$$x^2 + 42x + 441 = 961$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 21)^2 = 961$$

Undo the squaring.

$$x + 21 = \pm\sqrt{961}$$

$$x + 21 = \pm 31$$

Subtract 21 from both sides.

$$x = -21 \pm 31$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 10$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 50 feet. The total area, of the square and rectangle, is 464 square feet. What is the value of x?

$$x^2 + 50x = 464$$

$$x^2 + 50x + 625 = 1089$$

$$(x + 25)^2 = 1089$$

$$x + 25 = \pm 33$$

$$x = 8$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 24 feet. The total area, of the square and rectangle, is 217 square feet. What is the value of x?

$$x^2 + 24x = 217$$
$$x^2 + 24x + 144 = 361$$
$$(x + 12)^2 = 361$$
$$x + 12 = \pm 19$$
$$x = 7$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 54 feet. The total area, of the square and rectangle, is 1207 square feet. What is the value of x?

$$x^2 + 54x = 1207$$
$$x^2 + 54x + 729 = 1936$$
$$(x + 27)^2 = 1936$$
$$x + 27 = \pm 44$$
$$x = 17$$